

## Claims

- [c1] 1. A dither algorithm, for four-time resolution refining for an image comprising a plurality of frames scanned with a plurality of pixels, each pixel comprising a plurality of bits, an observed unit being a 4x2 block of the pixels, the observed unit having a first sub unit and a second sub unit, each the sub unit comprising a 2x2 block of the pixels, the 2x2 block having an upper-left pixel, an upper-right pixel, a lower-left pixel, and a lower-right pixel, the 2x2 block having an upper row consisting of the upper-left pixel and the upper-right pixel, and having a lower row consisting of the lower-left pixel and the lower-right pixel, the dither algorithm comprising:  
for each of the pixels of the first sub unit of the observed unit,  
when the 2-bit least significant bits (LSBs) being 00, no operation is rendered,  
when the 2-bit LSBs being 01, a first operation is rendered in repeated sequential fashion in a four-frame period to the upper-left pixel, the lower-right pixel, the lower-left pixel, and the upper-right pixel,  
when the 2-bit LSBs being 10, a second operation is rendered in repeated sequential fashion in a two-frame pe-

riod to the pixels of the lower row and the pixels of the upper row,

when the 2-bit LSBs being 11, a third operation is ren-  
dered as the first operation is; and

for each of the pixels of the second sub unit of the ob-  
served unit,

when the 2-bit LSBs being 00, no operation is rendered,  
when the 2-bit LSBs being 01, a fourth operation is ren-  
dered in repeated sequential fashion in the four-frame  
period to the lower-left pixel, the upper-right pixel, the  
upper-left pixel, and the lower-right pixel,

when the 2-bit LSBs being 10, a fifth operation is ren-  
dered in repeated sequential fashion in the two-frame  
period as the second operation is,

when the 2-bit LSBs being 11, a sixth operation is ren-  
dered in a repeated sequential fashion in the four-frame  
period as the fourth operation is.

- [c2] 2.The algorithm as recited in claim 1, wherein  
the first operation is a carry;  
the second operation is the carry;  
the third operation is a none-carry;  
the fourth operation is the carry;  
the fifth operation is the carry; and  
the sixth operation is the none-carry.

- [c3] 3.The algorithm as recited in claim 2, wherein  
the carry comprises adding one to the remaining bits except the 2-bit LSBs of the pixel, and adding zero to the remaining bits except the 2-bit LSBs of the other pixels of the 2x2 block; and  
the none-carry comprises adding zero to the remaining bits except the 2-bit LSBs of the pixel, and adding one to the remaining bits except the 2-bit LSBs of the other pixels of the 2x2 block.
- [c4] 4.A dither algorithm, for four-time resolution refining for an image comprising a plurality of frames scanned with a plurality of pixels, each pixel comprising a plurality of bits, an observed unit being a 4x2 block of the pixels, the observed unit having a first sub unit and a second sub unit, each the sub unit comprising a 2x2 block of the pixels, the 2x2 block having an upper-left pixel, an upper-right pixel, a lower-left pixel, and a lower-right pixel, the 2x2 block having an upper row consisting of the upper-left pixel and the upper-right pixel, and having a lower row consisting of the lower-left pixel and the lower-right pixel, the dither algorithm comprising:  
for each of the pixels of the first sub unit of the observed unit,  
when the 2-bit least significant bits (LSBs) being 00, no operation is rendered,

when the 2-bit LSBs being 01, a first operation is rendered in repeated sequential fashion in a four-frame period to the upper-left pixel, the upper-right pixel, the lower-left pixel, the and lower-right pixel,

when the 2-bit LSBs being 10, a second operation is rendered in repeated sequential fashion in a two-frame period to the lower rowtemp and the upper row,

when the 2-bit LSBs being 11, a third operation is rendered as the first operation is; and

for each of the pixels of the second sub unit of the observed unit,

when the 2-bit LSBs being 00, no operation is rendered,

when the 2-bit LSBs being 01, a fourth operation is rendered in repeated sequential fashion in the four-frame period to the lower-left pixel, the lower-right pixel, the upper-left pixel, and the upper-right pixel,

when the 2-bit LSBs being 10, a fifth operation is rendered as the second operation is,

when the 2-bit LSBs being 11, a sixth operation is rendered as the fourth operation is.

- [c5] 5.The algorithm as recited in claim 4, wherein  
the first operation is a carry;  
the second operation is the carry;  
the third operation is a none-carry;  
the fourth operation is the carry;

the fifth operation is the carry; and  
the sixth operation is the none-carry.

- [c6] 6.The algorithm as recited in claim 5, wherein  
the carry comprises adding one to the remaining bits ex-  
cept the 2-bit LSBs of the pixel, and adding zero to the  
remaining bits except the 2-bit LSBs of the other pixels  
of the 2x2 block; and  
the none-carry comprises adding zero to the remaining  
bits except the 2-bit LSBs of the pixel, and adding one to  
the remaining bits except the 2-bit LSBs of the other  
pixels of the 2x2 block.